


# DETECTING CLUES AND DEPLOYING CODES



## *Recent Developments Have Rekindled the Search for Definitive HIV Treatments*

Effective and curative treatments for HIV once seemed implausible, but recent advances, along with the case of Timothy Brown, formerly known as the “Berlin patient,” have reinvigorated this line of research. For a decade, Brown remained the only individual believed by scientific consensus to have been cured of HIV. Recent reports of a second individual, the “London patient,” indicate he may have been cured as well. While the aggressive, highly toxic therapies that cured Brown and perhaps the London patient of their underlying cancers and HIV aren’t readily transferable, these cases provide a symbolic proof-of-principle that has galvanized research.

At the AIDS and Cancer Virus Program (ACVP), Frederick National Laboratory scientists are working to develop

vaccines to prevent HIV infection. They’re also seeking to better understand how the virus persists despite seemingly effective suppressive antiretroviral drug treatment as well as how the virus can rekindle infection if treatment is stopped. These two areas represent some of the highest priorities in AIDS research.

### **The Search for Both a Preventive Vaccine and Medication-Free Remission**

Reflecting the collaborative ethos of the ACVP and the Frederick National Laboratory, ACVP Director Jeff Lifson, M.D., and Oregon Health and Science University’s Louis Picker, M.D., developed an investigational vaccine that appears to induce immune responses not attained by previous vaccine candidates.

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*Frederick National Laboratory for Cancer Research*

**Frederick National Laboratory**  
for Cancer Research



An additional innovation pioneered by ACVP's Brandon Keele, Ph.D., uses laboratory-designed viruses that incorporate "molecular barcodes" (unique DNA-based identifier tags analogous to the barcodes used by grocery store scanners) to study nonhuman primate models of AIDS virus infection. When combined with DNA sequencing, this approach allows scientists to see which individual viruses are responsible for systemic infection, which ones persist during treatment, and which reactivate when treatment is stopped. The more researchers learn about these virus strands, the better their odds become of preventing infection and achieving medication-free remission in people living with HIV.

"We still have a long way to go," Lifson said. "Antiretroviral drugs work pretty well for people who have access to them, but a lot of people don't, and the drugs don't cure the disease. You have to take the drugs for the rest of your life. What can we do to understand why that is, and what can we do about it? That, along with ongoing efforts to develop a vaccine to prevent infection, is a big focus of our current work."



### **Jeff Lifson, M.D.**

Jeff Lifson leads the AIDS and Cancer Virus Program at the Frederick National Laboratory.

It has been nearly 40 years since scientists first recognized HIV as the virus responsible for AIDS, and much progress has been made. Yet, the search for a vaccine and more definitive treatment is ongoing. Fortunately, some of the world's most-respected HIV/AIDS researchers are at the Frederick National Laboratory, and their work is moving the field ever closer to that critical breakthrough.



## **AIDS and Cancer Virus Program**

### **More than 40 Years in the Making**

The AIDS and Cancer Virus Program (ACVP) has its origins in the earliest days of what is now known as the Frederick National Laboratory for Cancer Research.

Under an early contract in the 1970s, the AIDS Vaccine Program developed a unique technical infrastructure capable of growing and purifying large quantities of certain viruses, called oncogenic retroviruses, that are associated with tumor development in animals. Their ability to analyze those viruses biochemically helped support research at the National Cancer Institute.

In the 1980s, the AIDS Vaccine Program infrastructure was used for human cancer research after the first two human retroviruses associated with cancer, HTLV-I and HTLV-II, were isolated. Then, when HIV was identified as the cause of AIDS and found to be a retrovirus, the NCI again turned to the AIDS Vaccine Program to rapidly produce, purify, and characterize HIV. Though the quest for an effective HIV vaccine has proved daunting, that early approach established the paradigm by which the ACVP has operated ever since.

Today, the program leverages its unique expertise and innovative technical infrastructure to help meet emerging biomedical needs while also conducting cutting-edge, investigator-initiated research. It does so through research sections headed by principal investigators and research support cores that develop and provide unique technical capabilities in support of ACVP investigators and scientists around the world.

### **Collaborate with the Frederick National Laboratory**

The Frederick National Laboratory for Cancer Research is a shared national resource whose mission is to enable solutions to biomedical research questions and overcome challenges to progress. We actively establish partnerships among our scientists and external researchers in government, academia, industry and the nonprofit research community.

**[frederick.cancer.gov/workwithus](https://frederick.cancer.gov/workwithus)**